The Bhushan-Mishra Patent Activity Index (BM PAI)

We propose in this short note a new index to gauge invention activity in various technological fields. We call this index the ***Bhushan-Mishra Patent Activity Index (BM PAI)***, named after the creators of this index and authors of this note – Navneet Bhushan and Amit Kumar Mishra.

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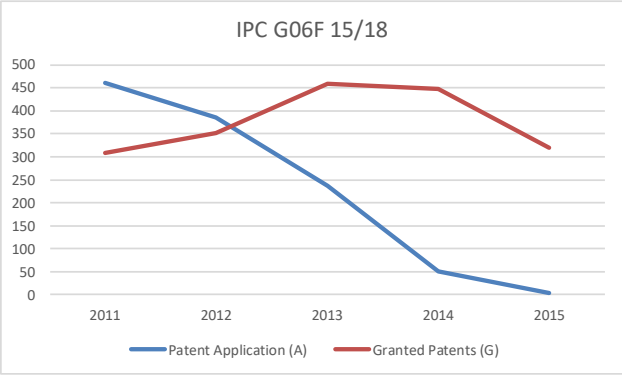
The Index computes what we call ***Recency Weighted Average (RWA)*** of last five years of ratio of number of patent applications published by number of patents granted normalized by the *Recency* weights for each International Patent Classification (IPC) class in each geography.

Example Computation of BM-PAI

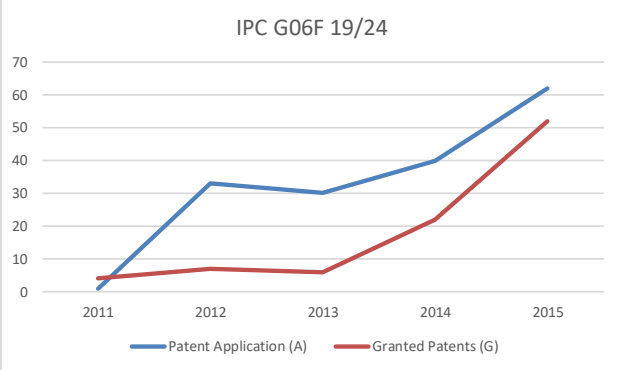
Let us consider two recent International Patent Classes (IPC G06F 15/18 and IPC G06F 19/24) pertaining to the highly active Machine Learning field. The G06F class is concerned with *"Digital Computing or Data Processing Equipment or Methods, Specially Adapted for Specific Functions"*. The specific G06F 15/18 is described as "in which a programme is changed according to experience gained by the computer itself during a complete run; Learning machines (adaptive control systems G05B)". While the class G06F 19/24 is meant "for machine learning, data mining or biostatistics, e.g. pattern finding, knowledge discovery, rule extraction, correlation, clustering or classification". As can be inferred from the description of these two IPC classes, 15/18 includes all those inventions that evolve a computer programme by taking inputs from large number of data-records or data-sets while 19/24 is more concerned with classifying, clustering of data into different categories and discovering rules or finding patterns in the data. 15/18 is about making a computer programme to change some of its connections so that it becomes a better representative of the data that it uses to represent, while 19/24 is more about key differences and characteristics hidden in the data that the programme is used to train or study.

IPC		Year				
G06F 15/18		2011	2012	2013	2014	2015
US	Application (A)	460	386	236	50	3
	Granted (G)	309	352	458	447	319
	Application per Granted Patent (A/G)	1.49	1.10	0.52	0.11	0.01
IPC		**Year**				
G06F 19/24		2011	2012	2013	2014	2015
US	Application	1	33	30	40	62
	Granted	4	7	6	22	52
	Application per Granted Patent (A/G)	0.25	4.71	5.00	1.82	1.19

The US Patent Trademark Office (US PTO) gives the following data on patent Applications and Granted Patents in these two IPC classes for last 5 years (2011-2015). Applications Published in these 5 years for IPC Classes G06F 15/18 and G06F 19/24 are 1135 and 166 respectively. The granted patents are 1885 and

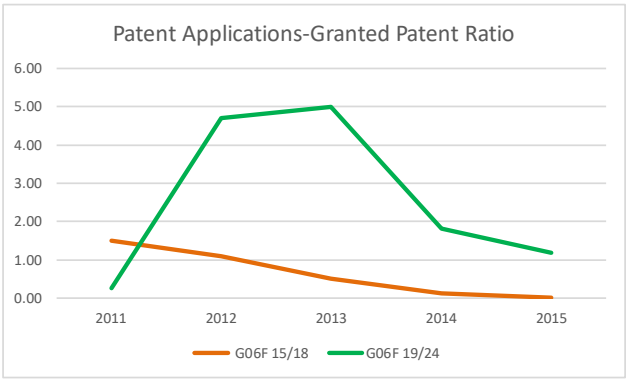


91 respectively. Following two plots shows



trends for Machine Learning Patents in these two IPC classes for last 5 years.

If one takes the ratio of these numbers, i.e., Applications (A) by Patents (G), we obtain A/G ratio for G06F15/18 and G06F19/24 to be 0.6 and 1.82, respectively. It is shown in the plot below. Clearly a shift from G06F 15/18 to G06F 19/24 is visible in last 5 years in Machine Learning patents.



We propose a Patent Activity Index (PAI) for an IPC class as described below. Let a_i's be number of patent applications published for the completed year i (where, i varies from 1 to 5. Let 1 be the current completed year and 5 being the oldest completed year). Let g_i be the number of granted patents for the year i. The Bhushan-Mishra Patent Activity Index for an IPC class is defined as

$BM\text{-}PAI_{2015}$ (IPC G06F15/18) =

$$\sum_{i=1}^{5} (1/i) \left(\frac{a_i}{g_i}\right) / \left(\sum_{i=1}^{5} \frac{1}{i}\right)$$

So, for IPC G06F15/18 $BM\text{-}PAI_{2015}$ is computed as

$BM\text{-}PAI_{2015}$ (IPC G06F15/18) = (0.01+(1/2)x0.11+0.52x(1/3)+1.10x(1/4)+1.49x(1/5))/(1+(1/2)+(1/3)+(1/4)+(1/5)) = 0.81/2.2833 = **0.35**

Similar computation for IPC G06F19/24 yields **$BM\text{-}PAI_{2015}$ (IPC G06F19/24) = 2.19**

As can be easily seen a value of BM-PAI < 1.0 indicates that the IPC class or the particular technology has low activity and definitely its immediate future in terms of active invention activity is not very bright. It may also be either saturated or it may still be at a very early stage. If the value of BM-PAI > 1.0 that indicates that number of Published Applications is more than the Granted Patents that clearly indicates the field or technology represented by the particular IPC class has lot of potential as it is an active invention arena. Hence the inventing activities in the particular IPC class will be more useful and may fetch higher value.

In the example above, the machine learning related IPC class G06F15/18 has a BM-PAI2015 of 0.35 while IPC class G06F19/24 has a BM-PAI2015 of 2.19. It is clearly indicative that problems related to learning through data has become saturated to a great extent (G06F15/18) while developing newer methods to carry out hidden pattern recognition, rules, clusters and categories in any dataset have lot of invention scope in near future.

If your company is thinking of developing inventions in machine learning you will be better off in solving problems related to G06F19/24 then problems related to G06F15/18, as the patent activity index is higher for 19/24 then for 15/18.

One caveat here. The PAI is an indicator of various stages of where in the possible stage of its evolution a particular technology is. If the PAI is between 1.0 and 2.0 it means the rate of applications is higher than patents being granted -

Applications of BM-Patent Activity Index

1. Managing Patent Portfolio
2. Forecasting technology trend
3. Strategic Patent filing
4. Identifying white space
5. Evaluating patent strength
6. Input for valuing patent
7. Patent quality Assessment (more/less citations)
8. Proposing Narrow and specific classifications while filing to maximize value
9. Enable the licensor to conduct the due diligence
10. Competitive analysis

Key Insights

<TBD>

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